

REMARKS

Claims 1-20 are currently pending in the application. By this amendment, claims 7-10 are amended and claims 12-20 are added for the Examiner's consideration. Support for the amendment(s) and added claims 12-20 is provided in at least Figures 3a-7 and at page 4 of the present specification. The specification is amended to correct a minor grammatical error. No new matter is added. Reconsideration of the rejected claims in view of the above amendments and the following remarks is respectfully requested.

Rejections Under 35 U.S.C. §103

In the Office Action, claims 1-3, 5 and 7-11 were rejected under 35 U.S.C. §103(a) over U. S. Patent No. 6,286,768 to Vettters et al. in view of U. S. Patent No. 5,964,483 to Long et al. Claims 4 and 6 were rejected under 35 U.S.C. §103(a) over Vettters, Long and U.S. Patent No. 5,275,443 to Klinger. These rejections are respectfully traversed.

The Present Invention

The present invention is directed to a device and method for positioning parts in a fuel injector during assembly thereof. The present invention overcomes many of the shortcomings of known assemblies, including alignment problems, the need for additional parts and exacting machining standards. Particularly, known systems use a pin assembly for assembly parts of the fuel injector. The pin assembly adds additional parts, in addition to requiring precise machining for the pin holes. Without such precise machining, the fuel passages for the different parts of the injector will not align properly thus impacting on the optimum fuel metering properties of the fuel injector. To overcome these shortcomings, the present invention uses a band or curvilinear member positioned within a groove or key way of parts of the injector. This configuration aligns and maintains proper contact between the fuel passages and parts of the injector, itself. The machining of the grooves does not have to be as precise as that for the holes of a pin assembly and thus reduces labor and other costs. The present invention also provides for a more efficient

manner to align the parts of the fuel injector and thus leads to more optimum alignment of the fuel passages which, in turn, results in a more optimum fuel metering. In an embodiment, the curvilinear member, which may be a band, is wrapped about a portion or the entirety of the circumference of the parts of the fuel injector and within the grooves. In this manner, a proper contiguously abutting alignment between parts may be accomplished.

Prior Art Rejections

In the prior art rejections, the Examiner argues that Vettters discloses a first and second tubular member with a first and second key way, respectively. The first key way is deemed to be reference numeral 62 and the second key way is deemed to be reference numeral 66. The Examiner admits that Vettters does not show a curvilinear member. However, the Examiner is of the opinion that Long shows such a curvilinear member and that it would be obvious to use such member in the Vettters device.

First, Applicant submits that Vettters does not show two key ways. In Vettters, the injector body attaching device 12 includes an annular groove 62 and a first pin aperture 64 extending transversely through the upper portion of spring housing 40. Upon close inspection, reference numeral 64 clearly refers to a second pin aperture, not a key way. Specifically, at col. 4, lines 47-54, it is disclosed that

a second pin aperture 66 also extends through the upper portion of spring housing 40 on an opposite side of the spring housing from first pin aperture 64. First and second pin aperture 64, 66 extend generally parallel to one another and are positioned tangential to both recess 54 and annular groove 62.

Accordingly, the Vettters device does not include two key ways. Instead, there is one key way or groove and two pin apertures.

Now, it is clearly discernable that the pin hole 64 is used for a pin. In fact, referring to col. 4, the Vettters' disclosure discloses that the injector body attaching device 12 includes a pin

68 for each of the first and second pin apertures 64, 66. It is the use of a pin assembly which provides the shortcomings discussed above; namely, requiring very exacting machining for the pin apertures (i.e., resulting in added manufacturing costs), additional parts (i.e., pins) and at least three steps needed for assembly. Additionally, it is this very type of system that misalignment of the fuel ports can occur resulting in less than optimum fuel metering. All of these shortcomings are addressed by the present invention, which does not include a pin assembly. In fact, the present invention was specifically designed to eliminate the need for such pin assembly.

The Examiner is of the further opinion that Long shows the curvilinear member. However, it is first respectfully submitted that a combination of Vettters and Long appears to be improper. Specifically, the Vettters reference is directed to a pinned injector assembly and the Long reference is directed to a fluid coupling system. These references are of such divergent arts that one of ordinary skill in the art would not have even known to combine these reference in order to achieve the elements of the claimed invention. This is clearly supported by the fact that Vettters is classified in 239/533.2 (FLUID SPRINKLING, SPRAYING, AND DIFFUSING, FLUID PRESSURE RESPONSIVE DISCHARGE MODIFIER OR FLOW REGULATOR, Fuel injector or burner); whereas, Long is classified in 285/305 (PIPE JOINTS OR COUPLINGS, ESSENTIAL CATCH).

Second, Long does not compensate for the deficiencies of Vettters. That is, Long does not show two key ways. Instead, Long shows a semi-circular slot 44 extending from an outer wall through a principal body and into a bore, defined in an axially direction by sides 48 and 49 (col. 3, lines 32-35.) The sides are not key ways. Long also shows a retaining means 14 that fits within the slot 44. Although the retaining means 14 is U-shaped (with two legs 53 and 54) such device is not used in the same manner nor can it be adapted for a fuel injector as recited in the claimed invention. Specifically, the retaining means 14 is inserted into the slot 14 and engages with groove 18 of the inner coupling member 12. A fuel injector does not have a slot, and the machining of such a slot and use of the retaining member in conjunction with the groove 18

would also require such exacting machining and alignment that it would be impractical to use in a fuel injector. This may possibly even pose more problems than the use of a pin assembly.

Also, contrary to the Examiner's opinion, the retaining means 14 does not allow for abutting the first and second tubular members together. In Long, the coupling member 12 is clearly inserted into the outer coupling member 13; that is, the outer coupling member 13 has an inner diameter large enough to accommodate the outer diameter of the inner coupling member 12. The coupling members are not "contiguously abutting", but are telescopically adjoined. Contrary to the present invention, Applicant submits that the retaining means is designed in such a manner that it would not allow contiguous abutting of the two coupling members (since it is designed to fit within the slot of the outer coupling member 13). It is only by fitting within the slot, in combination with the inner coupling member 12 positioned within the outer coupling member, that the retaining means 14 is capable of connecting the assembly.

Additionally, Applicant further submits that such a combination of Vettters and Long would not even work. The use of the retaining means may require a completely new design of the Vettters injector, one that clearly is not contemplated by either reference. For example, the retaining member 14 of Long would require a slot so as to accommodate the bridge portion of the retaining means in addition to portions for accommodating the bights 53. Vettters does not have any of these features. Also, it is respectfully submitted that, as alluded to above, the Long retaining means 14 would not even be able to function on the Vettters' injector, even if a redesign was contemplated (which it is not contemplated). In Vettters, the injector parts are abutting together. However, the use of the retaining means 14 cannot and is not designed to have the parts abutting together in such a manner; the parts can only be telescopically connected in order to use the retaining means 14 of Long.

As to the Klinger reference, it is first submitted, much like that of Long, that this reference is of such a divergent art that one of ordinary skill in the art would not have contemplated using this reference in order to achieve the claimed invention. The Klinger reference is directed to a sliding collar having the same classification as that of Long. Second,

claims 4 and 6 depend from a distinguishable base claim and thus include the features thereof. Claims 4 and 6 would thus be distinguishable for the same reasons as claim 1.

Additionally, since these references do not show the features of the claimed invention, they also do not show the method of the claimed invention. For example, a combination of these references clearly do not show a first groove and a second groove, and preventing movement of the first groove relative to the second groove by inserting a member in the first groove and the second groove. The features of dependent claims 7-11 are also not shown.

For at least the above reasons, Applicant submits that the rejections under §103(a) should be withdrawn.

Added Claims

Claims 12-20 are added for the Examiner's consideration. Claims 12-19 are dependent on a distinguishable independent base claim and thus include the features of the base claim. Claim 20 is an independent claim and includes distinguishable features.

As to the dependent claims, Applicant submits that some of the distinguishable features include but are not limited to, for example:

- (i) a key portion fitting into the key way of the first and second tubular members (claim 12),
- (ii) abutting ends of the first and second ends of the curvilinear (claim 13),
- (iii) the key portion includes a resilient circular shape fitting into a v shaped key way (claim 16),
- (iv) a stamped portion extends into the key way (claim 17),
- (v) the first and second key ways are about a circumference of the first and second tubular members (claim 18), and
- (vi) the curvilinear member has at least a portion adapted to be disposed substantially about the circumference of the first and second tubular members within the first and second key ways (claim 19).

Independent claim 20 also includes allowable subject matter not shown in any of the references.

CONCLUSION

In view of the foregoing amendments and remarks, Applicant submits that all of the claims are patentably distinct from the prior art of record and are in condition for allowance. The Examiner is respectfully requested to pass the above application to issue. The Examiner is invited to contact the undersigned at the telephone number listed below, if needed. Applicant hereby makes a written conditional petition for extension of time, if required. Please charge any deficiencies in fees and credit any overpayment of fees to Attorney's Deposit Account No. 23-1951.

Respectfully submitted,



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